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ABSTRACT

Since the late 1980s, identifying nutritional problems in children's and adults' diets and developing initiatives to help Americans improve what they eat have received considerable attention. This policy brief summarizes 2 studies of children's nutrition with the objectives of describing the diets of school-age children as of the mid-1990s, examining the relationships between their participation in federal nutrition programs and dietary intake, and examining changes in their intake between 1989-91 and 1994-96. Data were obtained from more than 5,000 children, ages 6 to 18, who completed dietary intake interviews during either period. Regression models were used to estimate the relationship between school meal participation and dietary intake. Among the main findings are that children consumed too much dietary fat and sodium, and a large proportion of their food energy came from added sugars. Most children consumed enough vitamins and minerals, but there were some problem areas, including vitamins A and E, zinc, folate, and magnesium. Children's intake of food groups were consistent with their inadequate intakes of selected vitamins and minerals. Over the study period, trends in dietary intakes were mixed. Despite an increase in food energy intake from the early to mid-1990s, children's vitamin and mineral intakes remained constant, suggesting that calorie increases were driven by an increase in foods/drinks high in added sugars. The school meal programs appeared to have a positive effect on children's consumption of milk, fruit, vegetables, and associated vitamins and minerals. Areas of concern in children's diets are problem nutrients, failure to follow the Food Pyramid, and excessive fat intake. (KB)

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POLICY BRIEF

Food for Thought:

Children's Diets in the 1990s

March 2001

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U.S. DEPARTMENT OF EDUCATION
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Food for Thought: Children's Diets in the 1990s

Diet can influence a child's life—including physical growth, cognitive development, and health—in a variety of ways. Yet many children's diets fall short of recommended dietary standards. Substantial proportions of our nation's children fail to consume enough fruits and vegetables, leading to shortfalls in their intake of key vitamins and minerals. In addition, most children eat foods high in dietary fat and added sugars.

. . . many children's diets fall short of recommended dietary standards.

Since the late 1980s, identifying nutritional problems in children's and adults' diets and developing initiatives to help Americans improve what they eat have received considerable attention. For example, the Dietary Guidelines for Americans and the U.S. Department of Agriculture (USDA) Food Guide Pyramid encourage individuals ages two and above to limit their total fat and saturated fat intake and to eat a balanced diet that includes the recommended numbers of servings of the major food groups. These recommendations include two servings of fruits and three servings of vegetables daily—"five-a-day." However, fewer than one-third of American adults meet this target.

Many policymakers, nutritionists, and public health professionals are interested in how federal nutrition programs, such as the National School Lunch Program (NSLP) and the School Breakfast Program (SBP), contribute to children's overall nutrition. These programs reach many children—approximately 26 million participate in the lunch program and 6.6 million participate in the breakfast program each school day.

About the Study

This brief summarizes two studies of children's nutrition conducted by Mathematica Policy Research, Inc., for the Food and Nutrition Service of the USDA, using the 1989-1991 and 1994-1996 Continuing Survey of Food Intakes by Individuals (CSFII). The objectives were to describe the diets of school-age children as of the mid-1990s, examine relationships between their participation in the school meal programs and dietary intake, and examine changes in their intake between 1989-1991 and 1994-1996. The analysis used data for more than 5,000 children ages 6 to 18 who completed CSFII dietary intake interviews in either period. Newly developed statistical procedures helped produce better estimates of the prevalence of inadequate dietary intakes. These procedures allowed researchers to assess the adequacy of children's diets based on estimates of what children usually eat, rather than what they happened to eat on a single day. To estimate the relationship between school meal participation and dietary intake, researchers used regression models to control for observable characteristics in comparing the intakes of children who ate school meals versus those who did not.

Findings in Brief

- **Children consumed too much dietary fat and sodium, and a large proportion of their food energy came from added sugars.** Most children's intakes of total fat and saturated fat were well above recommended maximum levels. In addition, nearly all children consumed more than the recommended maximum level of 2,400 mg of sodium, while a large portion of their food energy came from added sugars.

- **Most children consumed enough vitamins and minerals, but there were some problem areas, including vitamins A and E, zinc, folate, and magnesium.** Teenage girls were at especially high risk of inadequate intakes—few consumed adequate amounts of these problem nutrients, and they were also likely to consume inadequate amounts of iron and phosphorus.
- **Children's intakes of food groups were consistent with their inadequate intakes of selected vitamins and minerals.** Few children met the recommendations in the USDA Food Guide Pyramid for intake of the five major food groups, including fruit, vegetables, grains, dairy products, and meat and meat substitutes. By contrast, children consumed large amounts of some beverages, such as soda and fruit drinks, that are high in added sugars.
- **Over the study period, trends in children's dietary intakes were mixed.** Children's food energy intake increased during the early to mid-1990s, and because their absolute intake of total and saturated fat (in grams) remained constant, their intake of fat as a percentage of food energy declined over this period. However, despite the increase in calorie intake, children's vitamin and mineral intakes remained constant, suggesting that the calorie increase was driven by an increase in foods and drinks high in added sugars.
- **The school meal programs appeared to have a positive effect on children's consumption of milk, fruit, vegetables, and associated vitamins and minerals.** In addition, evidence suggests that the school lunch and breakfast programs led to a trade-off in children's intake of dietary fat versus added sugars. Those who ate school meals had lower intakes of added sugars but higher intakes of total dietary fat and saturated fat than nonparticipants.

SELECTED DIETARY GUIDELINES

- Eat a variety of foods.
- Eat plenty of grain products, vegetables, and fruits.
- Limit fat, saturated fat, and cholesterol intake.
- Limit sugar intake.
- Choose a diet moderate in salt and sodium.

Dietary Quality: Room to Improve

The study suggests that the following are areas of concern in children's diets: problem nutrients, failure to follow the Food Pyramid, and excessive fat intakes.

Problem Nutrients. Nearly all school-age children met the reference standards for the B vitamins (except folate), but many children of all ages were at risk of inadequate intakes of folate, magnesium, zinc, and vitamins A and E. In general, older children and females had lower intakes than younger ones and males.

Teenage girls were at especially high risk of inadequate vitamin and mineral intakes. In addition to the nutrients listed here, large numbers of teenage girls failed to consume adequate amounts of iron and phosphorus. For some nutrients, inadequate intakes were extremely common. For example, about 9 out of 10 teenage girls consumed too little folate and magnesium.

For most nutrients, racial/ethnic differences in the prevalence of inadequate intakes were small. Compared with Hispanic and white children, however, non-Hispanic black children were at increased risk of inadequate intakes of calcium, phosphorus, and vitamin A.

Failure to Follow the Food Pyramid. Most children ate fewer servings of the five major food groups than the USDA Food Guide Pyramid recommends. Most ate fewer than the recommended three servings of vegetables, two servings of fruit, and two servings of meat

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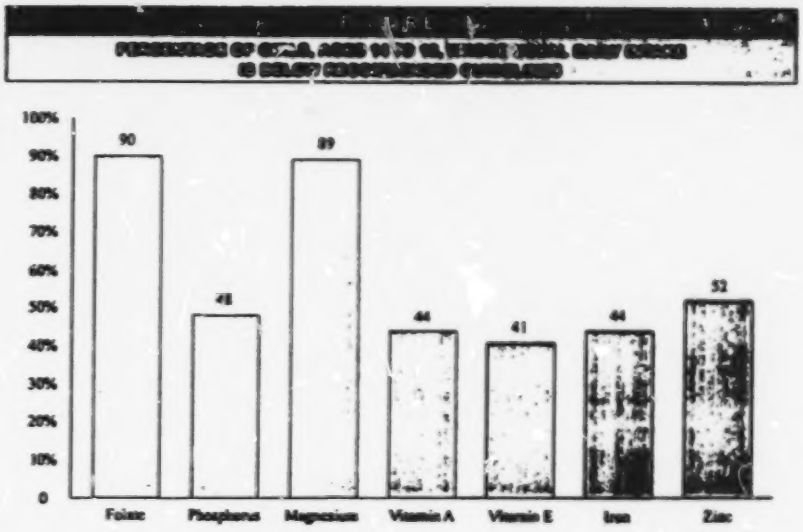
One-third of teenage girls consumed three or more servings of soda a day.



and meat substitutes. For example, only one-third met the recommendation for fruit intake, while 45 percent met the vegetable recommendation.

Older girls had especially low intakes of vegetables and dairy products. On average, teenage girls consumed only 2.8 servings of vegetables (compared with 3.9 servings for teenage boys) and 1.4 servings of dairy products (compared with 2.5 servings for teenage boys).

On the other hand, older boys and girls consumed regular or diet soda quite often. Among teenage boys, more than half consumed three or more servings a day, and one in five consumed five or more servings a day. One-third of teenage girls consumed three or more servings of soda a day.

Excessive Fat Intakes. Most school-age children consumed too much fat, saturated fat, and sodium, and not enough fiber. About three-fourths fell short of the dietary recommendations for the intake of these nutrients. In addition, children's diets were high in added sugars, with about 20 percent of their calories—or about 25 teaspoons a day—derived from added sugars. Among racial/ethnic groups, non-Hispanic blacks were least likely to meet the recommendations for intake of fat, saturated fat, fiber, and sodium. Non-Hispanic whites had the highest intake of added sugars.

Trends Over Time: A Mixed Picture

Monitoring trends in children's diets provides important information for policy initiatives and improvements. Overall, school-age children's intake of calories increased between 1989-1991 and 1994-1996, while their intake of fat as a percentage of calories decreased. On the other hand, their consumption of soda and fruit drinks increased over this period.

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During the study period, children's food energy intake increased from 88 to 94 percent of the Recommended Energy Allowance. This increase, which was driven primarily by foods eaten at dinner and as snacks during the day, held for all school-age males and for females ages 14 to 18. It did not hold for younger females. Among racial/ethnic groups, the increase was largest for white children.

Despite the increase in food energy intake during the study period, intakes of most vitamins and minerals did not change much. The increase in food energy intake without a corresponding increase in vitamin and mineral intake may reflect increased consumption of foods or drinks high in added sugars and relatively low in nutrients. This is a cause for concern.

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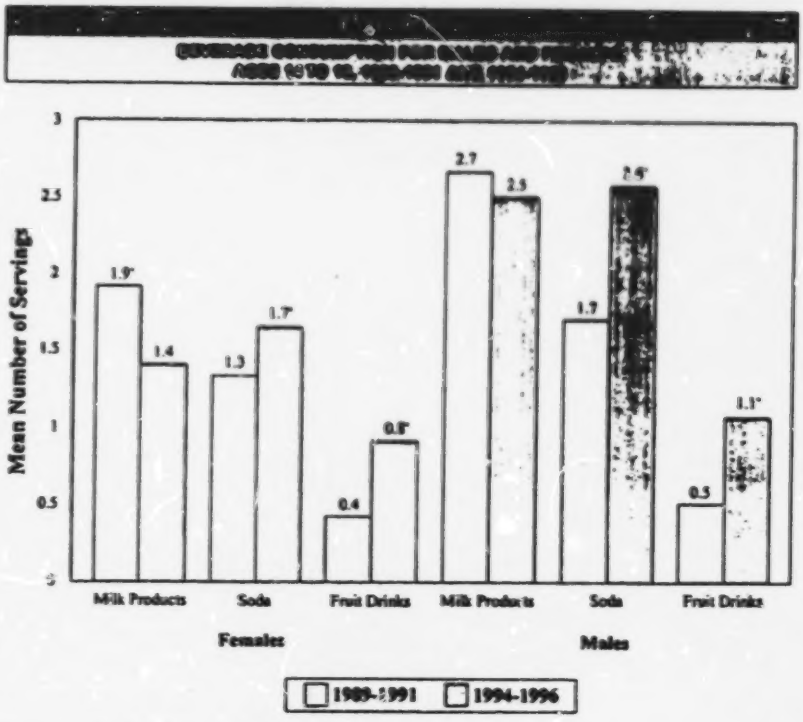

*Change over time is statistically significant at the 1 percent level.

Children's total fat and saturated fat intake as a percentage of food energy decreased, although absolute fat intakes did not decline. In particular, total fat intake fell from 34 to 32 percent of food energy, and saturated fat intake fell from 13 to 12 percent of food energy. Although overall total fat intake as a percentage of energy decreased over time, most children still failed to limit their total fat intake to no more than 30 percent of food energy and their saturated fat intake to less than 10 percent of food energy.

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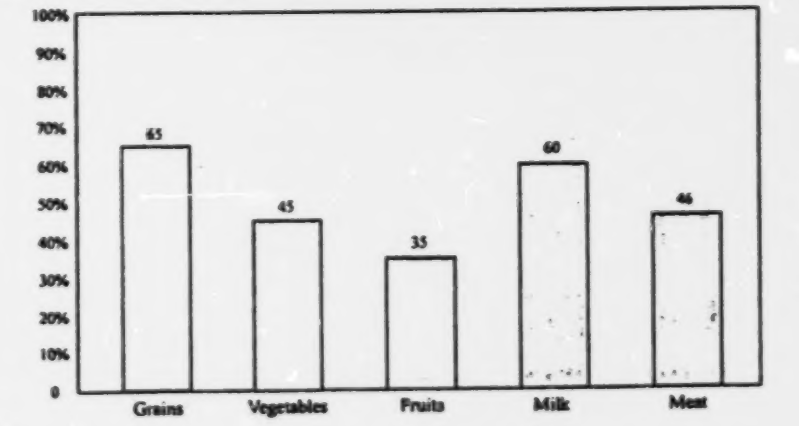
Children who are well fed are likely to be healthier and to learn, work, and behave better than children who are hungry.

Children's consumption of vegetables and grain products increased over this period, while consumption of fruit remained constant. Consumption of milk products, meat, and meat substitutes decreased. The increase in vegetable consumption was largest for males and females ages 14 to 18. On average, children's daily consumption of fruit and vegetables increased from 3.7 servings in 1989-1991 to 4.1 in 1994-1996. Clearly, however, consumption fell well below the recommended "five-a-day."

Beverage choices changed substantially during the study period. Consumption of whole milk decreased, while consumption of lower-fat milk, soda, and fruit and fruit-flavored drinks increased. These changes were especially pronounced for older children (ages 14 to 18). For example, teenage boys' consumption of soda rose from an average of 1.7 to 2.6 servings a day between 1989-1991 and 1994-1996, while their consumption of fruit drinks more than doubled. Teenage girls experienced similar increases in soda and fruit drink consumption, and their consumption of milk products decreased from 1.9 to 1.4 servings a day.

How Did School Meals Contribute to Children's Diets?

Based on data for 1994-1996, school meal programs made an important contribution to school-age children's diets and may have also influenced school performance. Children who are well fed are likely to be healthier and to learn, work, and behave better than children who are hungry. Overall, more than half the children who attended school on a given day ate a school lunch; one in five ate a school breakfast (among those who attended schools with a breakfast program). Children who ate both a school breakfast and a school lunch on a given day got over half of their daily food energy from the school cafeteria.



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NSLP participation was associated with higher mean intakes of food energy and many nutrients, both at lunch and over 24 hours. For example, those who ate a school lunch consumed greater amounts of vitamin B_6, vitamin B_{12}, thiamin, riboflavin, calcium, phosphorus, magnesium, and zinc at lunch than those who did not eat a school lunch, even after controlling for students' observable characteristics.

NSLP participation was also associated with higher intakes (at lunch and over the entire day) of total fat, saturated fat, and sodium, and lower intakes of added sugars. The differences in fat and sugar intakes were particularly large. Including all foods consumed at lunch (even those not part of the NSLP lunch), children who ate a school lunch got 15 percent of their lunch calories from saturated fat and 13 percent from added sugars. Those who did not eat a school lunch got only 11 percent of their lunch calories from saturated fat but got 23 percent from added sugars.

On average, students who ate a school lunch drank about three times as much milk at lunchtime . . .

The trade-off between the higher intake of dietary fat for NSLP participants and the higher intake of added sugars for nonparticipants may have been related to beverage consumption. On average, students who ate a school lunch drank about three times as much milk at lunchtime, but only half as much soda as those who did not eat a school lunch.

For the SBP, participation was associated with higher intakes of food energy, calcium, phosphorus, and vitamin C. Unlike participation in the NSLP, however, SBP participation did not affect students' 24-hour intakes of fat or added sugars.

In addition to these effects on nutrient intakes and beverage consumption, the study found that the school meal programs influenced children's food choices. For example, students who participated in both the school breakfast and lunch programs came much closer to meeting the "five-a-day" goal for fruit and vegetable consumption (with 4.5 servings a day) than nonparticipants (with 3.8 servings a day).

Children's Diets in the 21st Century

The results of these two studies point out some strengths and weaknesses in the nutritional quality of children's diets at the end of the 20th century. An important goal of policymakers in recent years has been to lower children's intakes of dietary fat, and this appears to be occurring. Furthermore, most children, especially those who participated in school meal programs, consumed sufficient amounts of most vitamins and minerals. Despite the recent decrease in fat intake as a percentage of calories, however, most children still fail to meet dietary recommendations for intake of fat and saturated fat. Furthermore, the decrease in children's relative intake of fat may have come about because of an increase in their intake of added sugars, a cause for concern. Another concern highlighted by these studies involves the low levels of vitamin and mineral intakes among teenage girls. As policymakers debate how to improve children's diets in the 21st century, they must find ways to promote lower-fat diets that are not high in added sugars. They must also look to promote greater consumption of vitamins and minerals among teenage girls.

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About the Authors

Philip Gleason is a senior researcher in Mathematica's Princeton office. His research interests include nutrition and welfare policy.

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